SECTION 13930

WET-PIPE SPRINKLER SYSTEMS WITH FIRE PUMP

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section:

1.2 WORK INCLUDED

A. Sprinkler System

B. Fire Pumps and Controllers

1.3 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. ANSI/NEMA MG 1 - Motors and Generators.

B. ANSI/UL 448 - Pumps for Fire Protection Service.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volt Maximum).

D. NFPA 13 - Installation of Sprinkler Systems.

E. NFPA 20 - Installation of Centrifugal Fire Pumps.

F. 2006 Virginia Uniform Statewide Building Code

1.4 GENERAL REQUIREMENTS: Section 15000, "Mechanical General Provisions", applies to this section, with the additions and modifications specified herein.

1.5 DESCRIPTION OF WORK: The work includes design and installation of a complete wet-pipe sprinkler complete with pumps, piping, fire department connections, valves, and fittings complete and ready for operation. Design and installation including equipment, materials, installation, workmanship, examination, inspection, testing shall be in accordance with the latest NFPA Standards except as modified herein.

1.6 SYSTEM DESCRIPTION

A. System to provide coverage for entire building.

B. Interface system with building fire and smoke alarm system.

C. Provide system to NFPA 13 light, ordinary hazard occupancy requirements.

D. Emergency Pressure System: Electric motor driven fire pump.

E. Provide fire department connection as indicated.

1.7 RELATED WORK

A. Section 15000, "Mechanical General Provisions".

B. Section 16721, " Addressable Fire Detection & Alarm System".

1.8 QUALITY ASSURANCE

A. **Contractor's** design and installation to conform to NFPA 13 and NFPA 20.

B. Equipment and Components: Bear UL, FM label or marking.

C. Welding Materials and Procedures: Conform to ASME Code. Conform to NFPA 20 for Fire Pump Installation **and NFPA 13-2007**.

D. Valves: Bear UL, FM label or marking. Provide manufacturer's name and pressure rating marked on valve body. Valves shall be approved for the intended use. Valves of similar type shall be of same manufacturer.

E. Provide pumps with manufacturer's name, model number, and rating/ capacity.

F. Test pump, driver, and controller in accordance with NFPA 20.

1.9 REGULATORY REQUIREMENTS

A. **Contractor shall submit shop drawings to the A/E for approval. Once approved by A/E, shop drawings shall be forwarded for review and approval by authority having jurisdiction. Shop drawings shall include the following:** Hydraulic Calculations, Product Data, Shop Drawings, and Low Water Pressure Cut-in Controller.

1.10 SUBMITTALS

A. Comply with Section **15000, MECHANICAL** GENERAL PROVISIONS.

B. Submit shop drawings and product data under provisions of **15000 MECHANICAL** GENERAL PROVISIONS **to the A/E**. **Contract Drawings (Bid Documents) are to show intention. The sprinkler shop drawings shall comply with NFPA 13, 2007. Obtain review under 1.9A, prior to purchase and installation.**

C. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories.

D. Indicate pump type, capacity, power requirements, affected adjacent construction.

E. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

F. Prior to submittal of shop drawings for technical review and approval by the authority having jurisdiction, City or County Fire Marshall, submit sprinkler head arrangement/locations to Architect/Engineer for approval.

G. Shop drawings to include space names, numbers and ceiling elevations including

those created by soffits, bulk heads, clouds, etc.

1.11 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data as required.

B. Include written maintenance data on components of system, servicing requirements, and Record Drawings.

C. Include pump operation, maintenance, and inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.12 EXTRA STOCK

A. Provide extra sprinkler heads under provisions of NFPA 13.

B. Provide suitable wrenches for each head type.

C. Provide metal storage cabinet in location designated.

D. Provide one set of gaskets for each pump type and model supplied for Owner's use.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Steel Pipe: ASTM A53; ASTM A120; black; galvanized.

B. Copper Tube: ASTM B75; B88; drawn, seamless.

C. Iron Pipe: ANSI/AWWA C151, ductile iron.

2.2 PIPE FITTINGS

A. Steel Fittings: ANSI/ASME B16.9, wrought steel, buttwelded, ANSI/ASME B16.25, buttweld ends, ASTM A234, wrought carbon steel and alloy steel, ANSI/ASME B16.5, steel flanges and fittings, ANSI/ASME B16.11, forged steel socket welded and threaded.

B. Cast Iron Fittings: ANSI/ASME B16.1, flanges and fittings, B16.4, screwed fittings.

C. Malleable Iron Fittings: ANSI/ASME B16.3, screwed type.

D. Copper Fittings: ANSI/ASME B16.18, cast bronze, solder joint, pressure, B16.22, wrought copper and bronze, solder joint, pressure type.

E. Ductile Iron Fittings: ANSI/AWWA C110.

2.3 JOINT MATERIALS

A. Solder: ANSI/ASTM B32, 95/5 alloy.

B. Brazing: ANSI/AWS A5.8.

2.4 PIPING SPECIALTIES

A. Automatic Sprinkler Valve: Flow detector with alarm circuits, pressure switch, pressure retard chamber.

B. Alarm Gong: Electric Type.

C. Fire Department Connection: Wall mounted type; brass; chrome plated finish; thread size to suit fire department hardware; two way threaded dust cap and chain of same material and finish, 3/4 inch automatic drip marked "Sprinkler - Fire Department Connection".

D. Valve cabinets: 20 gauge white enamel coated steel box to accommodate 2-1/2" fire department valve. Potter Roemer 1810 or approved equal.

2.5 SPRINKLER HEADS

A. Suspended Ceiling Type: Quick response recessed pendent type with chrome plated finish, with matching escutcheon.

B. Exposed Area Type: Quick response standard upright type with brass chrome plated finish.

C. Fusible Link: Temperature rated for specific area hazard.

D. Sprinklers utilizing ‘O’ rings are prohibited.

E. Flexible sprinkler heads shall be U.L. listed under Category VENF.

2.6 GATE VALVES

A. Bronze, rising stem, inside screw, solid wedge, manufactured by Grinnell, Stockham, Jenkins.

B. Iron body, bronze trim, rising stem, OS&Y, solid wedge, manufactured by Nibco, Stockham, Jenkins.

2.7 CHECK VALVES

A. Bronze, swing disc, manufactured by Grinnell, Stockham, Jenkins.

B. Iron body, bronze trim, swing disc, renewable disc and seat, manufactured by Grinnell, Stockham, Jenkins.

C. Iron body, bronze trim spring loaded, renewable composition disc, manufactured by Grinnell, Stockham, Jenkins.

2.8 CENTRIFUGAL FIRE PUMPS

A. Acceptable Manufacturers - Horizontal Centrifugal Pumps:

1. Allis-Chalmers Pumps.

2. Patterson Pumps.

3. Reddy-Buffaloes Pumps.

B. Furnish and install as shown on plans, one Patterson Fire Pump system, complete with pump, driver, controller and accessories. The Fire Pump shall be designed to deliver **375** gpm when operating against at TDH as shown below. The pump shall also deliver not less than 150% of rated capacity at a pressure not less than 65% of rated pressure. The shut off pressure shall not exceed 120% of rated pressure. Minimum suction pressure is **20** psig.

DESIGN POINTS

<u>gpm HD Requirement</u>
0 **59 psi** Max
375 50 psi Min (UL/FM Label)
600 40 psi Min

1. The Fire Pump shall be a **Armstrong (or acceptable manufacturer listed in 2.8 A)** Model **F4516** Horizontal split case, bronze fitted, single stage, double suction, centrifugal pump, vertically mounted with bronze shaft sleeves, cast wear rings and packed stuffing boxes with lantern rings, case iron casing with 150# discharge flange. Pump shall be listed by Underwriters' Laboratories, Inc. and approved by Associated Factory Mutual. The pumping unit shall meet all requirements of the National Fire Protection Association Pamphlet #20 (latest edition). Pump seals, casing and flanges shall be good for 250 psig working pressure.

2. The pumping unit shall include the following accessories:
Automatic air release valve.
Circulation relief valve.
Suction and discharge pressure gauges.
Outside hose valve manifold with hose valves, caps and chains (hose valve threads to match local fire department standards).
Eccentric suction reducer.
Concentric discharge increaser.
Pump coupler guard.

3. The drive shall be HP rated as scheduled on the drawings, vertical, plate mounted ODP ball bearing type AC induction squirrel cage motor; wound for voltage and phase as scheduled on the drawings, 60 cycle, a.c. operation. Locked rotor current shall not exceed the value specified in NFPA Pamphlet #20.

4. The fire pump motor control shall be completely assembled, wired and tested by the manufacturer before shipment from the factory, and shall be marked "Fire Pump Controller". The controller shall be located as close as practical and within sight of the motor.

5. The controller shall be so located or protected that it will not be injured by water escaping from the pump or connections. The controller shall be of the across-the-line type for motors rated 20 HP or less, and electronic solid static type soft start for motors larger than 20 HP, and shall be complete with externally operable disconnect switch circuit breaker with an interrupting capacity as indicated on the electrical drawings, pressure switch, pilot lamp to indicate circuit breaker is closed and power available, ammeter test link and volt meter test studs and a two

position selector switch marked "Automatic and Non-Automatic".   Necessary contacts and relays shall be provided to actuate alarm circuits indicating pump operation and power failure at controller. If the pump is required to be provided with standby power, provide a combination motor controller/automatic transfer switch assembly. Coordinate with the electrical drawings. Controller shall be a fully equal to Firetrol model FTA with externally operable pressure setter and indicator.

6. The pump, drive, controller, transfer switch (if required) and all accessories shall be purchased under a unit contract. The pump shall be given a complete performance test with positive suction pressure. Certified performance curves for both conditions shall be prepared and submitted for approval prior to shipment. Pump shall also be hydrostatically tested to twice the shut-off pressure but in no case less than 250 lbs. per square inch.

7. The pump manufacturer shall assume responsibility to provide the services of a factory-trained engineer to supervise installation and to be available to conduct final field acceptance test. The fire pump shall be set to start automatically on a fall of pressure to (as required by approving authority) psig and to be manually stopped.

2.9 JOCKEY PUMPS

A. Acceptable Manufacturers:

1. Armstrong Pumps.

2. Taco Pumps.

3. **Grundfos Pumps.**

B. The contractor shall furnish and install in location as shown on the plans a **Armstrong** fire jockey pump with bronze fitted construction. The pump shall have a capacity of **10** gpm at **70** psig TDH. The pump is to be furnished with case wear rings and mechanical seal with all metal parts to be 316 SS, Buna-N bellows, Ni-Resist seat and carbon washer. The pump is to be close-coupled to a 60 cycle, a.c. and ODP electric motor as scheduled on the drawings with stainless steel motor shaft. Jockey Pump shall be suitable for 250 psig working pressure and supplied with casing relief valve.

C. The jockey pump shall be supplied complete with a wall mounted factory-wired and tested jockey pump controller. Panel assembly shall be rated for the available fault current indicated on the electrical drawings. The unit shall be suitable for operation on 60 cycle, a.c. as scheduled on the drawings and shall be of the automatic across-the-line type complete with pressure switch, magnetic motor starter, door interlock and hand-off automatic selector switch and pump running light. Jockey pump shall be arranged to start **and stop** automatically.

2.10 BACKFLOW PREVENTER

A. Reduced Pressure Backflow Preventers: Provide UL listed for fire service and ASSE 1013 approved reduced pressure backflow preventers where

indicated, as manufactured by Watts 900 Series, or equal by Febco or Conbraco. Provide strainer with blow down valve upstream of device in accordance with manufacturer's recommendations. Provide with air gap fitting piped to nearest floor drain or other approved location.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate work of this Section with other affected work.

3.2 INSTALLATION - PIPING

A. Connect wet sprinkler system to water source as required.

B. Locate fire department connection with sufficient clearance from walls, buildings, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle, and within maximum required distance from fire hydrants.

C. Locate outside alarm gong on building wall.

D. Place pipe runs to minimize obstruction to other work.

E. Place piping in concealed spaces above finished ceilings.

F. Center heads in ceiling tile, provide piping offsets as required.

G. Apply strippable tape or paper cover to ensure concealed sprinkler head cover plates do not receive field paint finish.

H. Ream pipe and tube ends to full inside diameter.

I. Remove burrs and bevel plain end ferrous pipe.

J. Remove scale and foreign material, inside and outside, before assembly.

K. Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

L. Coat threaded ends with pipe lubricant compound.

M. Install piping in accordance with NFPA 13 for sprinkler systems and NFPA 20 for fire pumps.

N. Do not penetrate building structural members unless indicated.

O. Provide sleeves when penetrating floors and walls.

P. Seal pipe and sleeve penetration to achieve fire resistance equivalent to fire separation required.

Q. Install flexible heads per manufacturer instructions and according to the most

recent UL listing.

3.3 INSTALLATION - PUMP

A. Pipe drain from pump bases, pump stuffing boxes, and pump casings to floor drains.

B. Provide air vent valves on pump cases.

C. Use long radius elbows on suction side of pump.

D. Do not support piping from pump casing.

E. Align base mounted pumps.

3.4 INSTALLATION - VALVES

A. Install valves with stems upright or horizontal, not inverted.

B. Provide gate valves for shut-off or zone isolating service.

C. Provide drain valves at main shut-off valves, low points of piping and apparatus.

D. Provide supervision for valves as required.

3.5 CLEANING

A. Flush entire piping system of foreign matter.

3.6 SYSTEM TESTS

A. Hydrostatically test entire system, per NFPA 13 and 20.

B. Test shall be witnessed by authority having jurisdiction.

C. Provide pump, fittings, and controls complete in accordance with National Fire Codes Standard No. 20 "Centrifugal Fire Pumps" to meet requirements of the **2006** VUSBC Building Code. The pump manufacturer shall provide all accessories and attachments. The pump manufacturer shall provide installation instructions, and supervise start-up, final adjustment, and testing of the system. Unit shall bear UL/FM seal of approvals for the specified conditions.

D. Provide all piping and accessories including temporary pumping equipment to provide system protection during construction as directed by the City or County Building Officials and Fire Marshall.

E. **Contractor shall provide third party verification for installation of suspended ceiling rails meeting ASTM C635 and installation method meeting ASTM C636. Third party verification shall provide certificate that all standards were met. Third party verification shall be by an approved, independent special inspector for compliance with the most recent listing requirements and manufacturer's installation instructions.**

END OF WET-PIPE SPRINKLER SYSTEMS WITH FIRE PUMP